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COSTING STUDENTS IN HIGHER EDUCATION--A CASE STUDY. A PROGRESS REPORT.

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THE UNIVERSITY OF OREGON IS THE SUBJECT OF A PILOT UNIT COST STUDY IN HIGHER EDUCATION. THE STUDY IS TO PROVIDE THE BASIS FOR A SET OF SOCIAL ACCOUNTS WHICH WILL FACILITATE INTELLIGENT ALLOCATION OF EDUCATIONAL RESOURCES. DATA FOR THE STUDY WAS OBTAINED FROM THE FALL TERM UNIVERSITY RECORDS FOR 1964 AND 1966. FOUR DIFFERENT ASPECTS OF COSTS ARE INVESTIGATED--(1) ALLOCATION OF COSTS BY TYPE OF STUDENT, (2) DISTRIBUTION OF RESOURCES AND BURDENS, (3) CHANGES IN COSTS OVER TIME, AND (4) RESOURCE ALLOCATION WITHIN A UNIVERSITY. FINDINGS INCLUDE--(1) THE AVERAGE COST PER COURSE TAKEN RISES WITH THE LEVEL OF STUDENT, (2) THERE IS GREAT VARIABILITY IN AVERAGE COST PER COURSE TAKEN BY TYPE OF STUDENT AT EACH LEVEL, (3) RELATIVE TO THEIR BURDEN, THE SCIENCES HAVE MORE AND THE SOCIAL SCIENCES FEWER RESOURCES THAN THE AVERAGE OF ALL INSTRUCTIONAL AREAS, (4) THERE IS A LACK OF FLEXIBILITY OF RESOURCES IN A UNIVERSITY, (5) "SCALE EFFECTS," "MIX EFFECTS," AND "BUDGET EFFECTS" CAN EITHER INCREASE OR DECREASE COSTS OVER TIME, AND (6) REALLOCATION OF EXISTING STAFF HAS MANY RIGIDITIES WHICH NECESSITATE MORE OPTIMUM ALLOCATIONS OF NEW FACULTY MEMBERS. THIS PILOT STUDY IS OF LIMITED SCOPE. A MORE DISAGGREGATED STUDY WHICH COVERS MORE INSTITUTIONS AND EMPLOYS A MORE SOPHISTICATED CONCEPT OF COST IS RECOMMENDED. (HW)

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A Progress Report
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COSTING STUDENTS IN HIGHER EDUCATION: A CASE STUDY

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COSTING STUDENTS IN HIGHER EDUCATION:
A CASE STUDY

BARRY N. SIEGEL

What is disturbing is that the colleges as a rule are not inclined to estimate their unit costs for services already being given. For example, the major universities do not estimate the cost of, say, the freshman curriculum every few years, or the cost of running a particular department or, more important, the cost of turning out a student in one department rather than in another. Generally no attempt is made to estimate the cost of giving a particular course. These unit costs change greatly from year to year without inspection, as a rule, by the authorities. It would be helpful, for example, to know how much it would cost to turn out a student in paleontology, say, twenty-five years ago and today, and to measure this against the value to society and to the student of a paleontologist today as against twenty-five years ago. Similar remarks may be made regarding other fields. What may have been a justifiable expenditure, given educational objectives twenty-five years ago or even ten years ago, is not necessarily justifiable today. Therefore, if it is at all possible, it is wise to inspect the costs of a course, of departments, of curricula, etc., every few years. It is not easy to transfer resources from one department to another or from one course to another, but gradually adjustments can be made--especially through allocations of new money.[1]

Introduction

This is a study of costs in higher education. It attempts, at least in part, to meet the complaint voiced by Seymour Harris in the above quote. I have allocated direct instructional costs for the fall terms of 1964 and 1966 at the University of Oregon among various types of students at different levels. The allocations allow me to answer such questions as: How much of the instructional budget is absorbed in the education of lower division, upper division, and graduate students? How much of the budget is devoted to the education of lower division, upper division, and graduate Social Science, Science, Humanities, and other students? What is the average instructional cost of each type of

student, taking into account his typical load of course work? What is the distribution of instructional costs amongst various course types and course levels? How does this distribution compare with the distribution of course enrollments between course types and levels? Finally, how do costs behave over time?

Looked at in a broader perspective, this study is a first step in the building of a set of social accounts for higher education in the State of Oregon. The higher education budget of any state serves to educate different sorts of students, to promote a variety of research, and to provide numerous community services. Social policy respecting these matters would be much advanced if we knew the quantity of higher education resources actually being devoted to each of these activities. Together with estimates of the benefits of each activity, we would be in a position to make more rational allocations of our resources among them.

The study also has potential uses as a managerial tool for institutional executives. Estimates of student costs by level of students, when combined with forecasts of enrollments of students at each level, make it possible to present the legislature with a more realistic request for funds.[2] Distributions of instructional costs, when compared with distributions of course enrollments, should help executives to assess the equity and, perhaps, the efficiency of internal budgetary allocations. One of the tools of this study--the course enrollment matrix--is a potential instrument for use in forcasting course enrollment implications of various types of students. If patterns of student preferences and of course requirements are stable, it may be possible to predict the pattern of course enrollments from predictions of enrollments of various types of students. Such predictions would help personnel planning. Finally, the study should enlighten executives on the reasons for

changes over time in costs in various parts of the institution. With such knowledge it might be possible to effect a more efficient internal allocation of resources.

All these good things will not come true as a result of this paper. This is only a report of a pilot study. The study was limited to the fall terms of 1964 and 1966 at the University of Oregon. Costs refer only to direct faculty instructional costs. Direct nonfaculty instructional costs, indirect instructional costs, and allocated common (overhead) costs are not included in the cost figures reported. Moreover, costs are reported on a gross rather than a net basis. To obtain a true estimate of the resource cost of graduate students, for example, I should have subtracted from graduate instructional costs an estimate of the subsidy given to the institution by graduate students. This subsidy, which results from graduate students doing teaching and research at less than professional pay, was not estimated in this study. In the future, I plan to expand the findings to include all allocable costs and subsidies for the whole state system of higher education. I also plan to report the findings on an annual basis and to include several years.

Materials for Cost Estimates

The University of Oregon makes direct instructional cost estimates for each department and college in the University. These estimates are broken down by level of offering. Separate estimates of the number of FTE's (Full-time Teaching Equivalents) are also made for each department and college, by level of course. The University uses reports of individual faculty members as to the division of their teaching time in order to allocate FTE's to various courses. The FTE's are then multiplied by the salaries paid faculty in order to arrive at costs for individual courses. In this study, the course cost

Exhibit: Hypothetical Course Enrollment Matrix

	Courses				
	A		B		
Students	Undergraduates	Graduates	Undergraduates	Graduates	Total
A. Undergraduates	10	0	10	0	20
Graduates	5	10	5	10	30
B. Undergraduates	10	0	10	0	20
Graduates	5	10	5	10	30
Total	30	20	30	20	100

figures provided by the University were allocated to students of various types within each course. These allocations were then summed for each type of student in order to estimate the direct instructional costs by type of student, taking into account his total program. These summed course costs provided the basis for estimates of the average cost per course taken by student type and for estimates of the total instructional cost per student (taking into account the average number of courses per student) by type of student.

Allocation of course costs by type of student within each course required the building of a course enrollment matrix. This was accomplished by sorting grade cards by student type for each course. There were about 47 thousand grade cards for 1964 and 56 thousand for 1966. Needless to say, a computer was used to develop the matrix. A much reduced, hypothetical example of the course enrollment matrix is given in the accompanying exhibit.

The ratio of any given cell number to its column total gives the factor by which a given course cost can be multiplied in order to allocate costs in that course to the student type represented in the cell. When this is done for each column in a given row, the summed result gives the total cost of the particular kind of student.

The course enrollment matrix has other uses. The ratios of the cells to the row totals represent a stylized version of the program taken by the average student identified in the row. The program reflects the tastes of the student, the set of course requirements he must meet, the courses he has already taken, and the rationing of places by individual departments. Nevertheless, if the ratios are roughly stable over time, we can use them to predict enrollment changes in each course from knowledge of changes in the mix of students and/or changes in the absolute numbers of students in various categories. The matrix

would also be useful in the study of the enrollment consequences for the rest of the University of changes in course requirements. Finally, if the matrix were estimated for a series of years it would provide valuable information on changes in student flows within and between departments.

Allocation of Costs by Type of Student

Tables I and II show three things for Fall 1964 and Fall 1966: a) the direct instructional costs of all the courses taken by students of each type and level, b) the number of course enrollments by students of each type and level,[3] and c) the average direct instructional cost per course taken of each student type and level.

As might be expected, average cost per course taken rises with the level of student, regardless of student type. Graduate students, however, are not as expensive as usually portrayed. Ordinarily, university cost analysts compare cost per credit hour offered at each level of instruction in order to determine relative costs. For example, they divide the total number of graduate credit hours taken by students by the instructional costs allocated to those courses. They then compare the result with similarly derived unit costs at other levels of instruction. This method does not allow for several important facts: 1) graduate students often take undergraduate courses; 2) upper division students take many lower division courses and sometimes graduate courses; 3) many lower division students take upper division courses; and 4) the average number of courses taken by students varies inversely with the level of the student. Tables III and IV for 1964 and Tables V and VI for 1966 illustrate the importance of these considerations. The apparent cost spread is ultimately reduced by one half and more when moving from the Cost Per Credit Hour basis in columns (1) of Tables III and V to the Average Cost

Table I

DIRECT INSTRUCTIONAL COSTS OF COURSES TAKEN, BY STUDENT MAJOR AREA AND LEVEL. UNIVERSITY OF OREGON, FALL 1964

A. Total Costs and No. of Courses Taken by Student Major and Level							B. Cost Per Course Taken by Student Maj	
Major Area of Student	Lower Division		Upper Division		Graduate		Lower Division	Upper Division
	Cost of Courses Taken	No. of Courses Taken	Cost of Courses Taken	No. of Courses Taken	Cost of Courses Taken	No. of Courses Taken		
Liberal Arts	613,766	26,207					$23.42	
Social Sciences			74,525	2094	78,737	992		35.59
Humanities			126,636	3383	79,031	968		37.43
Science			38,473	942	109,725	1206		40.84
Pre-Professional			27,074	757	35,707	415		35.76
Architecture & Allied Arts			30,759	851	24,711	316		36.14
Business Administration			142,605	3286	57,880	969		43.39
Education and Library Science			48,227	1300	76,542	1084		37.10
Health, Physical Education and Recreation			19,296	500	19,031	320		38.58
Journalism			17,503	472	5,996	77		37.08
Law					33,981	748		
Music			21,153	451	15,600	180		46.90
Total	$613,766	26,207	$546,251	14,036	$503,536 *537,517	6544 *7292	$23.42	$38.92

* Includes Law Students

Table I

RECT INSTRUCTIONAL COSTS OF COURSES TAKEN, BY STUDENT MAJOR AREA AND LEVEL. UNIVERSITY OF OREGON, FALL 1964

rses Taken by Student Major and Level						B. Cost Per Course Taken by Student Major and Level			
Lower Division		Upper Division		Graduate		Lower Division	Upper Division	Graduate	All Students
Cost of Courses Taken	No. of Courses Taken	Cost of Courses Taken	No. of Courses Taken	Cost of Courses Taken	No. of Courses Taken				
613,766	26,207					$23.42			
		74,525	2094	78,737	992		35.59	79.37	
		126,636	3383	79,031	968		37.43	81.64	
		38,473	942	109,725	1206		40.84	90.98	
		27,074	757	35,707	415		35.76	86.04	
		30,759	851	24,711	316		36.14	78.19	
		142,605	3286	57,880	969		43.39	59.73	
		48,227	1300	76,542	1084		37.10	70.61	
		19,296	500	19,031	320		38.58	59.47	
		17,503	472	5,996	77		37.08	77.86	
				33,981	748			*45.43	
		21,153	451	15,600	180		46.90	86.66	
613,766	26,207	$546,251	14,036	$503,536	6544	$23.42	$38.92	$76.94	$35.00
				*537,517 -	*7292				

Table II

DIRECT INSTRUCTIONAL COSTS OF COURSES TAKEN, BY STUDENT MAJOR AREA AND LEVEL. UNIVERSITY OF OREGON, FALL 196

A. Total Costs and No. of Courses Taken by Student Major and Level							B. Cost Per Course Taken by Student	
Major Area of Student	Lower Division		Upper Division		Graduate		Lower Division	Upper Division
	Cost of Courses Taken	No. of Courses Taken	Cost of Courses Taken	No. of Courses Taken	Cost of Courses Taken	No. of Courses Taken		
Liberal Arts	807,670.42	29,965					$26.95	
Social Sciences			152,106.68	4,092	187,951.65	2,127		37.17
Humanities			91,616.84	2,194	103,787.41	1,406		41.76
Science			62,209.84	1,458	186,313.28	1,650		42.67
Pre-Professional			45,502.72	1,196	1,498.29	26		38.05
Architecture & Allied Arts			101,258.42	2,002	46,571.97	617		50.58
Business Administration			84,693.99	1,989	49,887.79	729		42.58
Education and Library Science			60,750.14	1,487	107,601.35	1,434		40.85
Health, Physical Education and Recreation			32,079.03	941	33,838.20	590		34.09
Journalism			22,718.28	703	9,254.65	174		32.32
Law					53,848.04	939		
Music			24,759.45	488	22,041.86	212		50.74
Total	807,670.42	29,965	677,695.39	16,550	748,746.45 *802,594.49	8,965 *9,904	$26.95	$40.95

Table II

CT INSTRUCTIONAL COSTS OF COURSES TAKEN, BY STUDENT MAJOR AREA AND LEVEL. UNIVERSITY OF OREGON, FALL 1966

rses Taken by Student Major and Level						B. Cost Per Course Taken by Student Major and Level			
Lower Division		Upper Division		Graduate		Lower Division	Upper Division	Graduate	All Students
Cost of Courses Taken	No. of Courses Taken	Cost of Courses Taken	No. of Courses Taken	Cost of Courses Taken	No. of Courses Taken				
07,670.42	29,965					$26.95			
		152,106.68	4,092	187,951.65	2,127		37.17	88.36	
		91,616.84	2,194	103,787.41	1,406		41.76	73.82	
		62,209.84	1,458	186,313.28	1,650		42.67	112.92	
		45,502.72	1,196	1,498.29	26		38.05	57.63	
		101,258.42	2,002	46,571.97	617		50.58	75.48	
		84,693.99	1,989	49,887.79	729		42.58	68.43	
		60,750.14	1,487	107,601.35	1,434		40.85	75.04	
		32,079.03	941	33,838.20	590		34.09	57.35	
		22,718.28	703	9,254.65	174		32.32	53.19	
				53,848.04	939			57.34	
		24,759.45	488	22,041.86	212		50.74	103.97	
07,670.42	29,965	677,695.39	16,550	748,746.45	8,965	$26.95	$40.95	$83.52	$40.27
				*802,594.49	*9,904			*81.04	*(40.55)

Per Student basis in the last columns of Tables IV and VI.

There is great variability in average cost per course taken by type of student at each level (Tables I and II). For upper division students, the spread was $11.31 in 1964 and $16.65 in 1966. The spread for graduate students was $31.51 in 1964 and $59.73 in 1966. Science graduate students were the most expensive in both years, but in neither year were upper division science students the most expensive; music students were. Between the two years, there was a great deal of switching around in relative position. Upper division students in Architecture and Allied Arts, for example, rose from being the eighth most expensive in 1964 to the second most expensive in 1966. This was an extreme case; nevertheless, only three of the five most expensive graduate students in 1964--those in Science, Social Science, and Music--remained in the top five in 1966. In some cases, unit costs actually fell--Journalism and Health, Physical Education, and Recreation graduate students for example.

I shall comment on the implications of this variability in unit costs below. For the moment, it suffices to remark that it seems to arise from 1) marked changes in student preferences, as reflected in the variations in numbers in different instructional areas and 2) budgetary allocations which are made independently of student choices of major. Given this situation, students to a large degree can determine their own unit costs by the course enrollment choices they make. This means that the spread in costs between students at different levels is also in some degree determined by student choice. The decline in spread between graduate and lower division students shown in the last column of Tables IV and VI illustrates this point.

As a final comment, it is necessary to note again that these cost esti-

Table III

Comparison Between Cost Per Credit Hour by Course Level and Cost Per Course Taken, by Level of Student. University of Oregon, Fall 1964

Level	Cost Per Credit Hour by Course Level (1)		Cost Per Course taken by Level of Student (2)	
	Dollars	% of Univ. Average	Dollars	% of Univ. Average
Lower Division	$6.55	58.2	$23.42	65.9
Upper Division	13.30	118.1	38.92	109.4
Graduate	33.11	294.0	76.94*	216.4
University Average	11.26	100.0	35.56*	100.0

*Excludes Law School

Table IV

Cost Per Student by Level of Student. University of Oregon, Fall 1964*

Level of Student	Average Number of Courses Taken (1)	Average Cost per Course Taken (2)	Average Cost per Student (1) x (2)
Lower Division	4.91	$23.42	$114.99
Upper Division	4.67	38.92	181.76
Graduate	2.94	76.94	262.04

*Excludes Law School

Table V

Comparison Between Cost Per Credit Hour by Course Level and Cost Per Course Taken, by Level of Student. University of Oregon, Fall 1966

Level	Cost Per Credit Hour by Course Level		Cost Per Course taken by Level of Student	
	Dollars	% of Univ. Average	Dollars	% of Univ. Average
Lower Division	$7.43	58.7	$26.95	66.9
Upper Division	14.27	112.8	40.95	101.7
Graduate	34.59	273.4	83.52*	207.4
University Average	12.65	100.0	40.27*	100.0

*Excludes Law School

Table VI

Cost Per Student by Level of Student University of Oregon, Fall 1966*

Level of Student	Average Number of Courses Taken (1)	Average Cost Per Course Taken (2)	Average Cost Per Student (1) x (2)
Lower Division	4.85	$26.95	$130.71
Upper Division	4.73	40.95	139.69
Graduate	2.81	83.52	234.69

*Excludes Law School

mates do not include instructional costs other than faculty pay. This means, among other things, that the true cost spreads are underestimated. Science students, for example, are more expensive than shown in Tables I and II. Needless to say, however, the above comments on the variability of spread still hold.

The Distribution of Resources and Burdens

The column totals of the course enrollment matrix, when combined with information on instructional costs and FTE's, provide information for comparing the distribution of the instructional burden with the distribution of resources available to the various instructional areas. Such comparisons are shown in Tables VII and VIII for the Fall 1964 and Fall 1966.

To interpret these tables, consider 1964. The Social Sciences absorbed 22.35 percent of instructional costs and 21.41 percent of the FTE's. These resources were used to handle 23.89 percent of total course enrollments. Measured either in money or "real" terms, the Social Sciences received fewer resources relative to their instructional burden than did the average of all instructional areas. The Sciences, on the other hand, had more resources relative to their burden than the average of all instructional areas.

How did the Social Sciences react to this relatively unfavorable situation? Notice, first, that they lavished roughly the same percentage of resources on graduate students as did the Sciences. Second, in order to do so they squeezed men and money out of their upper division and, especially, their lower division classes. As Table VIII shows, this situation was even more pronounced in 1966.

The situation of the Social Sciences in 1964 and 1966 illustrates the lack of flexibility of resources in a university. Overall course enrollments increased by something over 20 percent in the two years. Enrollments in the

Table VII

PERCENTAGE DISTRIBUTION OF DIRECT INSTRUCTIONAL COSTS, FACULTY TIME, AND COURSE ENROLLMENTS, BY DIVISION AND LEVEL OF COURSES AT THE

Area	A. 100 x (Direct Instructional Costs / Total Direct Instructional Costs)				B. 100 x (Teaching FTE / Total Teaching FTE)				C. 100 x(
	L	U	G	T	L.	U	G	T	L.
Social Sciences	6.20	9.04	7.11	22.35	7.35	8.27	5.79	21.41	12.94
Humanities	9.94	8.01	2.89	20.84	13.56	7.34	2.37	23.28	15.89
Sciences	6.11	6.47	6.45	19.03	6.85	6.12	5.10	18.09	9.40
Architecture & Allied Arts	2.54	5.39	1.74	9.67	3.04	5.28	1.52	9.84	4.31
Business Administration	1.36	3.57	1.56	6.49	1.45	3.58	1.26	6.29	1.96
Education and Library Science		4.31	2.92	7.23		4.35	2.42	6.77	.11
Health, Physical Education and Recreation	3.39	2.15	.80	6.34	4.01	2.30	.67	6.98	9.52
Journalism	.07	1.04	.29	1.40	.06	.96	.26	1.28	.32
Law			2.00	2.00			1.31	1.31	
Music	1.95	2.10	.59	4.64	2.07	2.08	.49	4.64	1.47
Total	31.56	42.08	26.35	100.00	38.39	40.28	21.20	100.00	55.92 3

L = Lower Division

U = Upper Division

G = Graduate

T = Total

Table VII

RECT INSTRUCTIONAL COSTS, FACULTY TIME, AND COURSE ENROLLMENTS, BY DIVISION AND LEVEL OF COURSES AT THE UNIVERSITY OF OREGON, FALL 1964

$100 \times \left(\frac{\text{Direct Instructional Costs}}{\text{Total Direct Instructional Costs}}\right)$				B. $100 \times \left(\frac{\text{Teaching FTE}}{\text{Total Teaching FTE}}\right)$				C. $100 \times \left(\frac{\text{Course Enrollments}}{\text{Total Course Enrollments}}\right)$			
L	U	G	T	L.	U	G	T	L.	U	G	T
6.20	9.04	7.11	22.35	7.35	8.27	5.79	21.41	12.94	8.81	2.14	23.89
9.94	8.01	2.89	20.84	13.56	7.34	2.37	23.28	15.89	6.08	.89	22.86
6.11	6.47	6.45	19.03	6.85	6.12	5.10	18.09	9.40	4.87	1.97	16.24
2.54	5.39	1.74	9.67	3.04	5.28	1.52	9.84	4.31	3.51	.46	8.28
1.36	3.57	1.56	6.49	1.45	3.58	1.26	6.29	1.96	3.09	.91	5.96
	4.31	2.92	7.23		4.35	2.42	6.77	.11	4.09	.92	5.12
3.39	2.15	.80	6.34	4.01	2.30	.67	6.98	9.52	1.76	.44	11.72
.07	1.04	.29	1.40	.06	.96	.26	1.28	.32	.95	.06	1.33
		2.00	2.00			1.31	1.31			1.58	1.58
1.95	2.10	.59	4.64	2.07	2.08	.49	4.64	1.47	1.43	.13	3.03
31.56	42.08	26.35	100.00	38.39	40.28	21.20	100.00	55.92	34.59	9.50	100.00

Table VIII

PERCENTAGE DISTRIBUTION OF DIRECT INSTRUCTIONAL COSTS, FACULTY TIME, AND COURSE ENROLLMENTS, BY DIVISION AND LEVEL OF COURSES AT TH

Area	A. 100 x (Direct Instructional Costs / Total Direct Instructional Costs)				B. 100 x (Teaching FTE / Total Teaching FTE)				C. 100 x (T	
	L	U	G	T	L	U	G	T	L	
Social Sciences	5.53	8.44	7.10	21.07	6.46	7.61	5.44	19.51	13.68	9
Humanities	9.29	7.02	3.20	19.51	12.85	7.23	2.66	22.74	11.21	5
Sciences	6.54	6.45	7.15	20.14	7.28	6.14	5.50	18.92	10.79	4
Architecture & Allied Arts	2.87	4.79	1.85	9.51	3.45	4.58	1.52	9.55	3.05	3
Business Administration	1.19	4.14	1.56	6.89	1.23	3.91	1.33	6.47	1.84	3
Education and Library Sciences	.03	5.68	3.55	9.26	.03	5.71	3.03	8.77	.16	4
Health, Physical Education and Recreation	3.36	1.66	1.04	6.06	4.01	1.65	.86	6.52	10.16	2
Journalism	.06	.69	.26	1.01	.04	1.22	.24	1.50	.32	1
Law			2.31	2.31			1.61	1.61		
Music	1.68	1.75	.84	4.27	1.89	1.73	.77	4.39	1.42	1
Total	30.55	40.62	28.86	100.00	37.24	39.78	22.96	100.00	52.63	36

L = Lower Division

U = Upper Division

G = Graduate

T = Total

Table VIII

F DIRECT INSTRUCTIONAL COSTS, FACULTY TIME, AND COURSE ENROLLMENTS, BY DIVISION AND LEVEL OF COURSES AT THE UNIVERSITY OF OREGON, FALL 196

A. $100 \times \left(\frac{\text{Direct Instructional Costs}}{\text{Total Direct Instructional Costs}}\right)$				B. $100 \times \left(\frac{\text{Teaching FTE}}{\text{Total Teaching FTE}}\right)$				C. $100 \times \left(\frac{\text{Course Enrollments}}{\text{Total Course Enrollments}}\right)$			
L	U	G	T	L	U	G	T	L	U	G	T
5.53	8.44	7.10	21.07	6.46	7.61	5.44	19.51	13.68	9.09	2.23	25.00
9.29	7.02	3.20	19.51	12.85	7.23	2.66	22.74	11.21	5.79	1.38	18.38
6.54	6.45	7.15	20.14	7.28	6.14	5.50	18.92	10.79	4.89	1.95	17.63
2.87	4.79	1.85	9.51	3.45	4.58	1.52	9.55	3.05	3.58	.56	7.19
1.19	4.14	1.56	6.89	1.23	3.91	1.33	6.47	1.84	3.48	.77	6.09
.03	5.68	3.55	9.26	.03	5.71	3.03	8.77	.16	4.81	1.29	6.26
3.36	1.66	1.04	6.06	4.01	1.65	.86	6.52	10.16	2.21	.73	13.10
.06	.69	.26	1.01	.04	1.22	.24	1.50	.32	1.19	.10	1.61
		2.31	2.31			1.61	1.61			1.90	1.90
1.68	1.75	.84	4.27	1.89	1.73	.77	4.39	1.42	1.19	.25	2.86
30.55	40.62	28.86	100.00	37.24	39.78	22.96	100.00	52.63	36.23	11.60	100.00

Social Sciences rose more rapidly, hence their share of enrollments rose to 25 percent from 23.9 percent. In the meantime resources lagged,[4] so that measured either by costs or by FTE, the relative position of the Social Sciences deteriorated. As a comparison, the Humanities experienced a large drop in their share of course enrollments and only a slight drop in their share of instructional resources.[5] In the absence of other information, one cannot judge whether this comparative performance is a good or a bad thing. The point is that in universities there is no mechanism, (such as relative profits in business firms) which automatically signals management to switch resources in response to shifts in demand. To be sure tenure and other work rules hinder the switching around of faculty in response to needs. Nevertheless, appropriate budgetary information can provide a signaling mechanism for management to at least allocate <u>new</u> resources in appropriate directions. If management does not respond to such signals, it must expect individual departments to respond in their own ways. Such, I think is the meaning of undergraduate squeeze in the Social Sciences.

Insights into the budgetary impact of university regulations can be illustrated by comparing lower division courses in the College of Health, Physical Education, and Recreation (HPE) with those in the Social Sciences. In both 1964 and 1966, the spread between relative resources and relative burdens was about the same. However, lower division courses in HPE are typically one-hour classes, while those in the Social Sciences are three-hour classes. Measured by relative resources and burdens, then, HPE was roughly three times better off than the Social Sciences. This situation arose because physical education is required of all lower division students, necessitating the scheduling of large numbers of small sections during all hours of the day.

A measure of the cost of this regulation is what it subtracts from the instructional budgets of other instructional areas in the University.

In sum, tabulations such as illustrated in Tables VII and VIII, which compare the distribution of resources and burdens between instructional areas, can give university executives useful information on the degree of flexibility of institutional resources and on the impact of regulations and other decisions on various parts of the institutions.

Analysis of Changes in Costs

It is possible to decompose the 1964-1966 changes in cost per course taken by any sort of student into three separate components: 1) those due to a change in the number of students in each major and at each level; 2) those caused by a change in student major and/or course preferences; and 3) those attributable to changes in budgetary allotments given to the courses in which students of any given type enrolled.

Consider upper division social science students: In 1964, average cost per course taken by these students was $35.59. In 1966 the cost was $37.17, or a change of $1.58. Suppose that upper division social science students in 1966 took the same courses as they did in 1964, and that they represented the same proportion of enrollment in these courses that they did in 1964. Assume, also, that the courses had not received extra money for faculty in 1966. Under these assumptions, average cost per course taken by upper division social science students would have declined by $17.38. This decline would have come about solely because of a doubling of course enrollments by this type of student. I shall call this the "scale effect".

The scale effect for each category of student for the 1964-66 period is shown by the diagonal-filled bars in Charts 1 and 2. Note that the scale

effect need not always work to lower average cost per course taken: For upper division students in the Humanities, Business Administration, and Music the scale effect raised costs. In every graduate category but Business Administration, however, the scale effect worked to reduce average cost. This fact explains much of the decline in spread in costs between graduate and undergraduate students.

Returning to the costs of upper division social science students, consider the effect of the change in their choice of courses and of the fact that they represented a larger proportion of the student body in 1966 than they did in 1964.[6] Call this combined change the "student-course mix effect" or, more simply, the "mix effect". The mix effect worked to raise unit costs by $10.65. It came about because the shift of students into the Social Sciences and the change in the pattern of courses taken by such students meant that they were absorbing a higher percentage of high cost courses in 1966 than they were in 1964.

On Charts 1 and 2, the mix effect is shown by the hatched bars. Like the scale effect, the mix effect need not always work in one direction. In Business Administration, the Humanities, Education, and Music, it operated to lower average costs for upper division students. At the graduate level, the mix effect lowered average cost per course taken by students in Business, the Humanities, Education, and Music. In the latter three cases, the scale effect and the mix effect reinforced one another.

Consider, finally, the result of adding the influence of changes in budgetary allotments to the courses taken by students in various categories--the "budget effect". For upper division social science students this was a positive $8.31. When combined with the scale effect and the mix effect, the

budget effect explains the total change in average cost per course taken.

Upper Division Social Science Students

Average Cost per Course Taken, 1964	$35.59
Scale Effect	-17.38
Mix Effect	+10.65
Budget Effect	+ 8.31
Average Cost per Course Taken, 1966	$37.17

The budget effect is described in Charts 1 and 2 by the bars containing vertical lines. Note that in all cases it was positive. Note also that it was larger, on the average, for graduate students than for undergraduate students. This reflects the rapid growth of graduate programs at the University. That the spread in costs between graduate and undergraduate costs declined over the two years is explained mainly, again, by the operation of a substantial average scale effect. The mix effect, on the average, worked to raise costs.

Notes on the Problem of Resource Allocation Within a University

Faculty members are hired and resources are bought in order to provision all three functions of a university: teaching, research, and community service. University administrators make lump sum allocations to departments with all three of these purposes (particularly the first two) in mind. If research is a dominant function, there is no reason why administrators should allocate funds in accordance with teaching loads. The administration may wish to concentrate its resources upon those departments in which it believes the research payoff will be greatest. The payoff, of course, may be measured by the prestige brought to the institution and by the monies brought in by research contracts. Other departments may or may

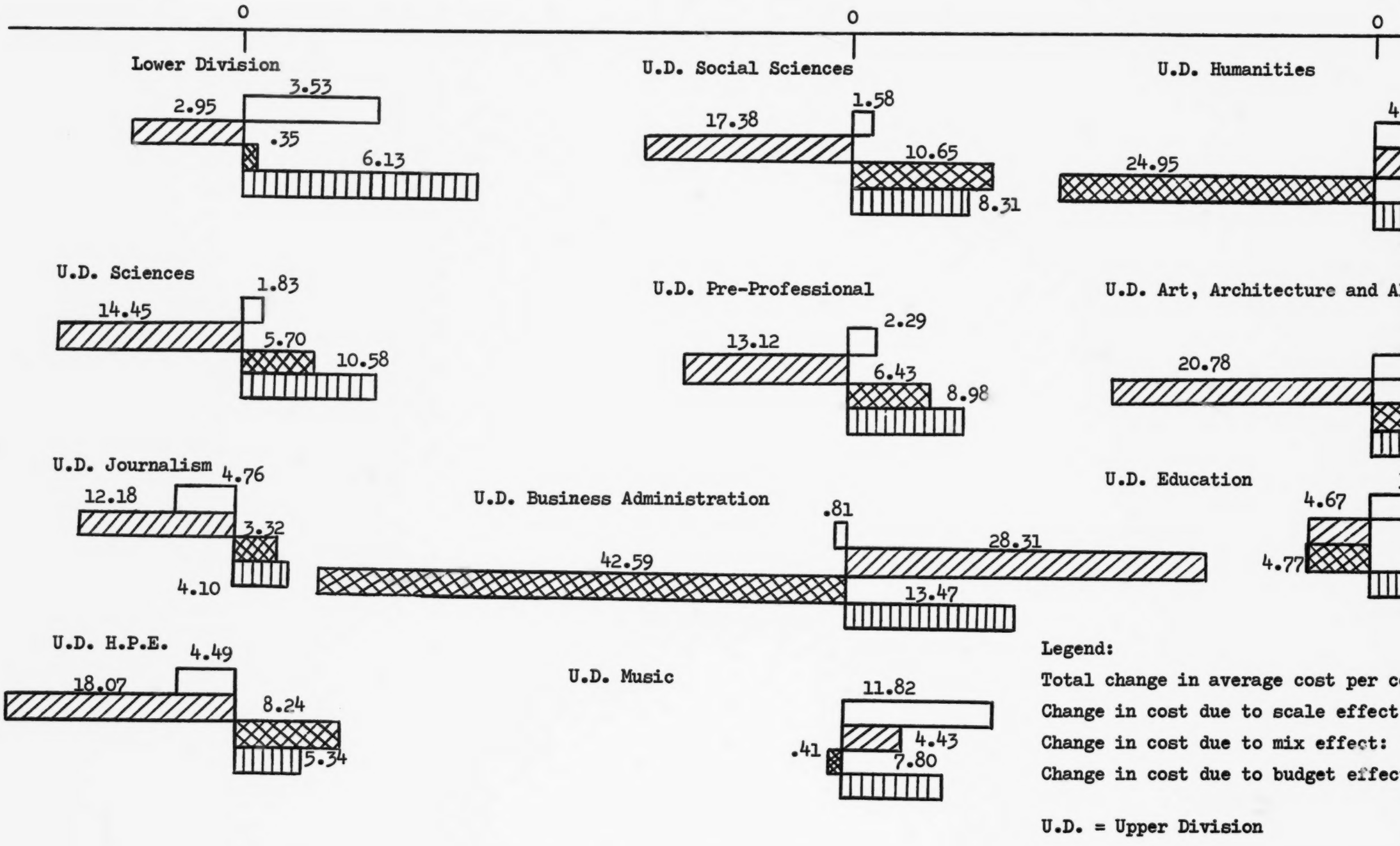
not benefit from these payoffs. That depends upon the way in which the administration distributes future revenues. In the meantime, other departments must accept and act upon the consequences of these budgetary allocations.

The problem is compounded by the inability of administrators to forecast or control student choices. As we have seen, over a span of time as short as two years there can be significant changes in the mix of students. These changes in student mix can have a heavy impact on certain departments. From an overall point of view, unplanned changes for which no provisions have been made can lead to serious inefficiencies. Departmental teaching and research programs can be seriously disrupted by sudden increases in student loads for which financial and real resources have not been provided. Excess capacity, both in teaching and research can be created elsewhere by such shifts.

Why do these rapid shifts in student population take place? I cannot attempt an answer here, but I would like to comment on one aspect of the problem. Undergraduate students, in particular, make program choices in a system which no way uses financial incentives to affect their choices. Once he has entered an institution, a student is free to pursue the program he wishes without differential charges being levied to penalize or encourage him in any particular way. Much of the same argument applies to graduate students, except the students in medical and other professional schools are sometimes charged differential rates. This is not to say that there are no differential costs to the pursuit of different programs. Some studies require more in the way of books and supplies than others, and the difficulty of some subjects exact extra costs in terms of amount of study time. Nevertheless, the general point is still valid. A formal financial incentive system, designed to influence student choices, is rarely used in American

Chart 1

Analysis of Changes in Cost per Course Taken, Lower Division and Upper Division Students, by Major.
Fall 1964 to Fall 1966. University of Oregon.
(In dollars)



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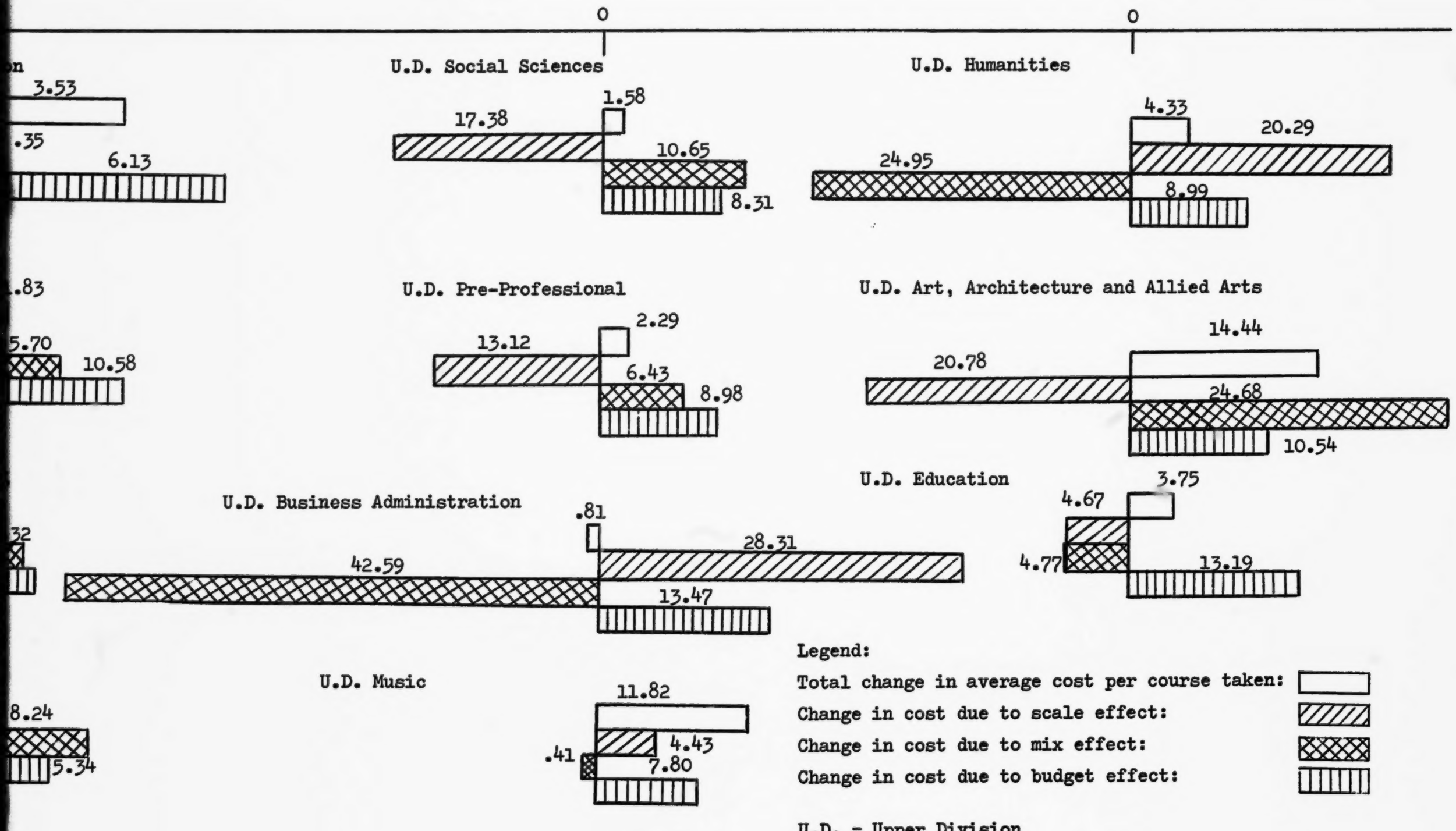


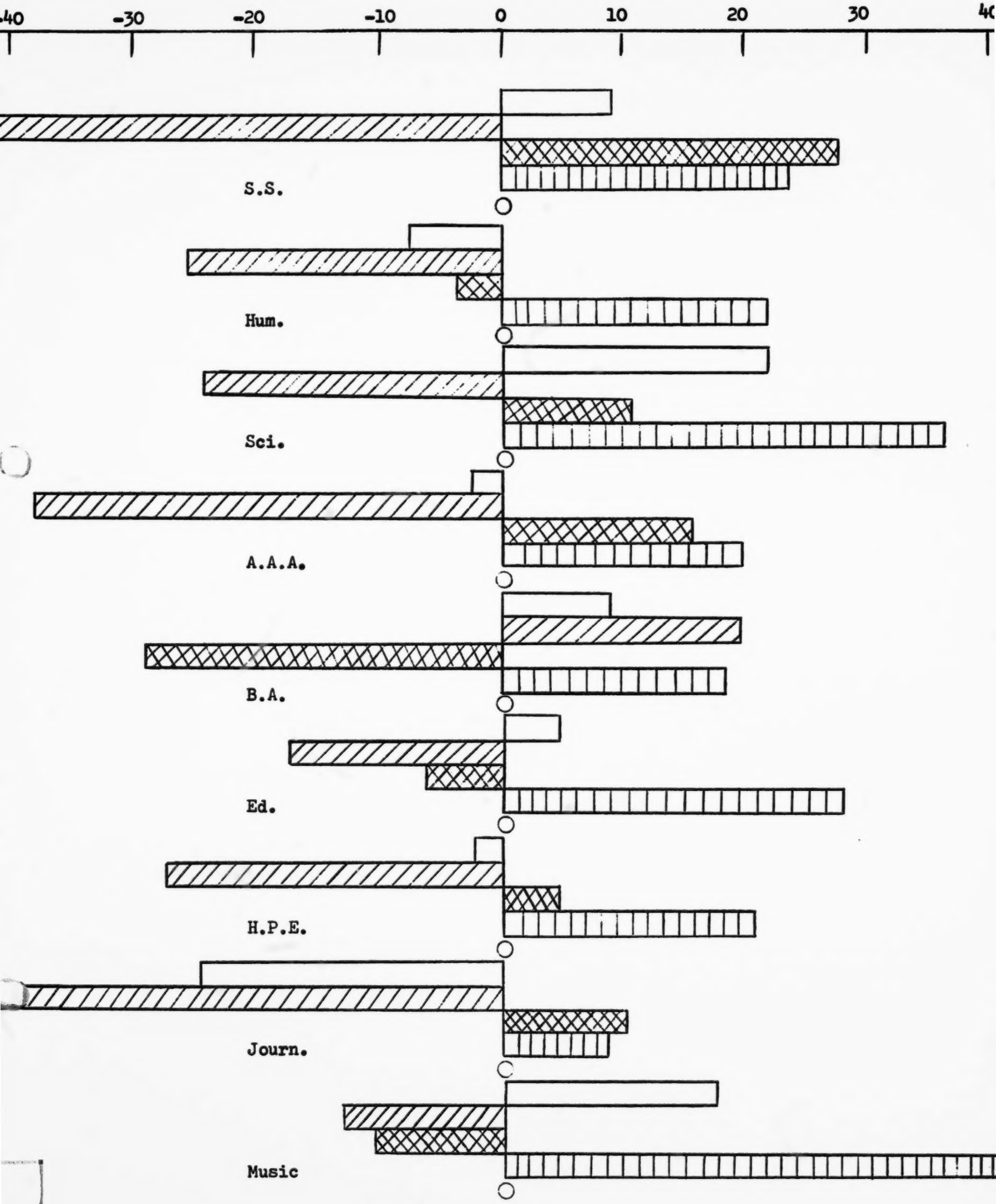
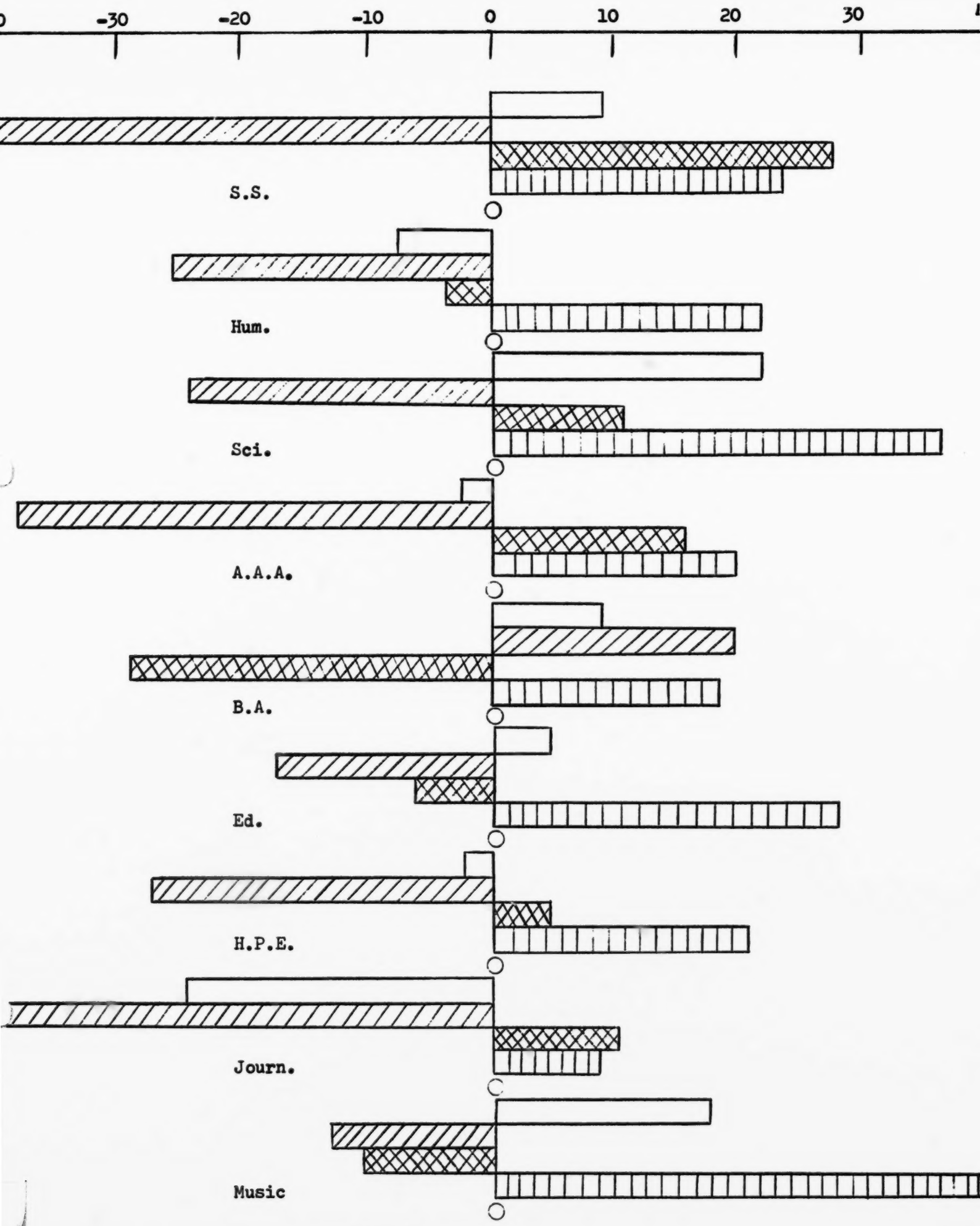

-40
-30
-20
-10
0
10
20
30
40
S.S.
Hum.
Sci.
A.A.A.
B.A.
Ed.
H.P.E.
Journ.
Music
Legend:
Total change:
Scale effect:
Mix effect:
Budget effect:

Chart 2

Analysis of Changes in Cost Per Course Taken by Graduate Students, by Major.
Fall 1964 to Fall 1966. University of Oregon
(In dollars)



universities. The "random element" in student composition is due, in part, to the lack of such a system. So long as the random element is present to a significant degree, efficient resource allocation within universities is seriously compromised.

Final Comments

In this paper I have attempted to provide the basis for a set of social accounts in higher education. Such information is necessary if society is to make intelligent allocation of its educational resources. I have also tried to show how information such as I have gathered can be used to speculate about problems of university administration. I am acutely aware of the limited nature of this pilot study. It needs expansion in several directions. It requires coverage of more institutions, more disaggregation, and more sophisticated concepts of cost. Educational costs include far more than salaries, books, buildings, and equipment. The principal cost in the educational process is the student's own time and effort. If we are to approach a true measure of the social costs of higher education, we must ultimately estimate the dollar value of these costs.

Sources of Information

1. Course enrollment information was taken from grade cards provided by the Registrar of the University of Oregon and from The Registrar's Report to the President, academic year 1964-1965, and 1966-1967.

2. Cost and FTE information was provided by the University of Oregon's Cost Analysis Department.

Footnotes

[1]Seymour E. Harris, Higher Education, Resources and Finances, McGraw-Hill, New York, 1962. Harris made this statement after an extensive survey of Universities and Colleges.

[2]Something of this sort is done by state institutions in Indiana. See James L. Miller, Jr., State Budgeting for Higher Education, Institute of Public Administration, University of Michigan, 1964, pp. 97-101.

[3]The instructional areas are defined as follows:

Social Sciences: Anthropology, Economics, History, Geography, Political Science, Psychology, Sociology, and Home Economics.
Humanities: English, Languages, Philosophy, Religious Studies, and Speech.
Science: Biology, Chemistry, Geology, Mathematics, and Physics.

These three areas comprise the College of Liberal Arts. All other areas, except for Education and the School of Librarianship, are reported as aggregated entities by the University of Oregon in their cost analyses.

[4]Over the two years, Social Sciences FTE's increased by 10 percent. At the same time Social Science course enrollments increased by 25 percent. For the University, FTE's increased by 29 percent, while enrollments rose by 21 percent.

[5]FTE's in the Humanities actually increased by 4.5 percent.

[6]Upper division students increased their load of upper division courses in 1966 over 1964. Recall, also, that students shifted out of the Humanities and Business Administration into the Social Sciences. See Tables I and II, parts A.